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# PATENT SPECIFICATION

NO DRAWINGS

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## COMPLETE SPECIFICATION

### Detergent Mixtures comprising Anionic Detergents and Cation-Active Compounds

We, REWO CHEMISCHE FABRIK G.M.B.H.,  
a German Body Corporate, of Steinau, Kreis  
Schlüchtern, Germany, do hereby declare the  
invention, for which we pray that a patent  
5 may be granted to us, and the method by  
which it is to be performed, to be particularly  
described in and by the following state-  
ment:—

10 The present invention is concerned with  
detergent mixtures comprising anionic deter-  
gents and cation-active compounds.

Anionic compositions are readily available  
15 and used for a whole host of pharmaceutical,  
cosmetic, hygienic, detergent or cleansing  
purposes. They may, for example, take the  
form of washing and cleansing compositions  
for textiles, e.g. blankets and carpets; solutions  
20 for cleansing medical equipment, food con-  
tainers and cutlery; hair preparations and  
shampoos; disinfectants; and deodorants. The  
anionic compositions are prepared from  
25 anionic mixtures which are diluted with water  
to provide aqueous solutions to which  
additives, e.g. germicides, emulsifiers, seques-  
trants, colourants and propellants may be  
added. One form of mixture comprises anionic  
30 detergents and cation-active compounds but  
such mixtures have the drawbacks that clear  
aqueous solutions cannot be obtained, the sol-  
utions react with turbid amorphous or crystal-  
line masses, e.g. soaps, and above all that  
35 unless the very minimum of cation-active  
compound is used, there is a tendency for the  
detergent to be precipitated. Because of this,  
such mixtures are usually used to prepare  
pastes, soaps, syndets or powders. It is possible  
40 to coat the cation-active compounds with  
inorganic electrically neutral salts in a pre-  
liminary stage but the resultant mixture only  
provides clear aqueous solutions when the  
concentration of anionic detergent is kept  
below 0.1% by weight. It is also possible to

secure clear aqueous solutions of higher deter-  
gent concentration where the detergent is a  
sulphated or sulphonated compound, but only  
if very high concentrations of non-ionic sub-  
stances are included. All in all, therefore, these  
mixtures suffer from serious disadvantages.

It has now been discovered that if only  
certain anionic detergents and certain cationic  
compounds are employed in a certain ratio  
range, the disadvantages mentioned are mini-  
mised, if not avoided completely. This invention  
therefore makes it possible to prepare  
any concentration of anionic detergent which  
solutions, moreover, exhibit a high degree of  
viscosity even at low levels of dilution.

According to this invention, there is there-  
fore provided a mixture for use as or in the  
preparation of solutions for any of the pur-  
poses hereinbefore specified, comprising a  
multi-functional anionic detergent and a  
cation-active compound, the proportion of the  
latter to the former not exceeding the molar  
ratio of

n - 1

—

m

where n and m represent the number of  
functions of the anionic detergent and cation-  
active compound, respectively.

The term "functions" in this connection  
means the number of reactive groups present  
in the compound. For example maleic acid  
having two reactive carboxylic groups is bi-  
functional and a sulphosuccinic acid having  
two reactive carboxylic acid groups and one  
reactive sulphate group in the molecule is tri-  
functional.

In the case of a bifunctional anionic deter-  
gent, the proportion of cationic compound (for

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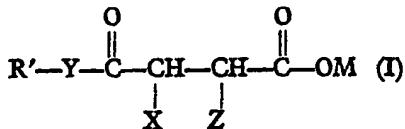
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[Pr]

example, a quaternary ammonium compound), may be up to a molar ratio of 1:1 and using a tri-functional anionic detergent, the proportion may be in a molar ratio of up to 1:2.

5 Preferred bifunctional anionic detergents include the sulphosuccinic acid derivatives of the general formula



10 in which R' represents an alkyl residue having at least 6 carbon atoms, Y represents a hydrocarbon chain optionally substituted with nitrogen or oxygen or both, either of X and Z represents a hydrogen atom and the other is the group  $-\text{SO}_2\text{M}$ , and M is a pharmaceutically or cosmetically acceptable cation e.g. a metal, amine, alkanolamine or ammonium. Other anionic detergents include:—

15 sulfo-fatty acids, for example  $\alpha$ -sulpho-fatty-acid;  
 20 compounds with two sulpho-groups;  
 compounds with one sulpho-group and one carboxyl group;  
 compounds with two carboxyl groups in the molecule;

25 phosphonic acids with an alkyl residue and two acid functions;  
 and alkylphosphoric acid esters with two acid functions.

Appropriate cation-active compounds include the so-called "onium compounds"; for example, the ammonium, phosphonium, pyridinium and sulphonium compounds. Compounds preferred for commercial availability and manufacturing capabilities include the 30 quaternary ammonium compounds of the formula

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pounds and the usual washing agent additives for example phosphates, silicates and inorganic salts. As a rule they can be mixed with certain monofunctional anionic compounds without precipitation of insoluble components.

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One advantage of the mixture of this invention is that a detergent compound usually considered to be insoluble can readily be formulated into an aqueous solution. If, for example, a sulphosuccinate which is soluble in water with difficulty in a 40% aqueous solution is mixed with an alkyltrimethylbenzylammonium chloride in equimolar proportions, the result is a thick paste which requires dilution to provide a clear solution. (The sulphosuccinate alone would have yielded the same product). On the other hand, if one instead follows the procedures of this invention and mixes a water-soluble sulphosuccinate with a water-insoluble quaternary ammonium salt (for example, an alkyltrimethylbenzylammonium saccharinate) in equimolar proportions, the result is a clear aqueous solution, even at a concentration of 40%.

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60 A further advantage of the invention is that the solutions obtained are clear at high concentrations of detergent and another is that despite their anionic behaviour the solutions fully retain the properties of the cationic ingredient. Moreover, the use of "onium" 65 compounds increases the viscosity considerably, so that, for example, even solutions with detergent contents of 10 to 5% still show a high viscosity. Further, the wetting power and also the calcium soap dispersing capacity is increased to a considerable extent without reduction of the cleansing or washing power and of the lathering capacity.

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75 Evaluations have also shown that materials cleaned by solutions of this invention are less susceptible to re-soiling due to electrostatic charge. Other evaluations have shown that the degreasing effect on skin and hair characteristic of the usual anion-active detergent compositions which contain cation-active material is diminished to a considerable extent.

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85 Further advantages are to be seen in that the activity of a cationic compound in a mixture of this invention is uninhibited by the presence of the anionic ingredient. For example, if the cationic ingredient is a quaternary ammonium compound, one can still take advantage of its disinfectant and antimycotic properties. Moreover, solutions prepared from mixtures of this invention can be used for chemico-technical purposes, for example, lending water repellence to natural or synthetic fibres or other substances and rendering synthetic fibres and synthetic resins ("plastics") anti-static.

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95 In order that this invention may be well understood, we now give some evaluations to show the properties of the mixtures of this invention and then formulations to prepare various types of solutions from them.

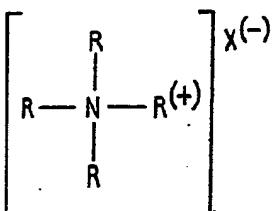
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40 in which X is an anion and R represents an alkyl group. Preferred anions for substituent X include the halides, the saccharinate anions, the phthalimidate anions,  $\text{HSO}_4(-)$  and the residue of an acid sulphimide. One of substituents R is desirably a long-chain alkyl residue having from 4 to 22 carbon atoms.

45 The mixtures may contain non-ionic com-

105

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(II)

**EVALUATIONS.**

I. Evaluation to show compatibility of cation compounds with anionic tensides.  
An aqueous washing solution containing

20% of anionic tenside was prepared and a quaternary compound added in a concentration of 20% of the detergent content, in accordance with the following Table.

5

Anion-active tenside present in solution	Appearance of solution when cation compound specified below added	
	Alkyldimethylbenzyl-ammonium chloride	Alkyldimethylbenzyl-ammonium saccharinate
Lauryl alcoholtiglycolether sulphate, Na salt	turbid	slightly turbid
Laurylalcohol sulphate, triethanolamine salt	turbid	turbid
Laurylalcoholtriglycolether sulpho-succinic acid ester, Na salt	clear	clear
Laurylalcoholtiglycolether sulpho-succinic acid ester, Na monoethanolamine salt	clear	clear

10 II. Evaluation to determine the bactericidal effect of a solution according to the invention.

1% of each quaternary product identified below was dissolved in an aqueous solution of 15 12% of the sodium salt of lauryltriglycolether sulphosuccinic acid ester. The content of

quaternary substance relative to the content of anionic detergent was about 9%, the total content of detergent being about 1%. Each solution was tested against *Staphylococcus aureus* according to the round filter method and the following results obtained

20

TABLE II

Active ingredient	Restriction of growth	
	Zone 1.	Zone 2.
Cleansing agent alone	0	0
with 1% of alkyltrimethylbenzylammonium saccharinate	7	7
with 1% of alkyltri methylammonium saccharinate	3	3
with 1% of alkyltrimethylbenzylammonium phthalimidate	7	7

**FORMULATIONS.**

25 1. A Viscous liquid shampoo having anti-dandruff and anti-static effect:  
16 parts of lauryltriglycolether sulpho-succinic acid ester, Na salt.  
1 part of alkyltrimethylbenzylammonium saccharinate  
30 4 parts of lauric acid diethanolamide  
2 parts of common salt and

77 parts of water were admixed with gentle heating to provide a clear hair shampoo of agreeable viscosity.

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2. A disinfectant:  
16 parts of lauryltriglycolether sulpho-succinic acid ester, Na salt.  
1 part of alkyltrimethylbenzylalkonium chloride  
40 4 parts of nonylphenolpolyglycolether

40

5 parts of common salt and  
74 parts of water  
were admixed with heating to provide a clear  
viscous liquid cleansing agent.

5. A disinfectant:  
16 parts lauryldiglycoether sulphosuccinic  
acid ester, Na monoethanolamine salt  
1 part alkyldimethylbenzylammonium  
phthalimidate

10 4 parts coconut fatty acid diethanolamide  
5 parts common salt and  
74 parts water  
were admixed with heating and gave a clear  
viscous liquid rinsing agent exhibiting a dis-  
infecting action.

15 4. A liquid cleansing agent having dis-  
infectant properties:—  
29 parts of sulphosuccinic acid semi-ester  
of fatty alcohol polyglycoether, Na salt  
20 1 part alkyldimethylbenzylammonium  
saccharinate  
70 parts water  
100 parts of a liquid cleansing agent contain-  
ing a disinfectant

25 5. A liquid rinsing agent having disinfectant  
properties:—  
20 parts of Na-alkylaryl sulphonate.  
5 parts fatty acid diethanolamide  
5 parts fatty alcohol diglycoether sul-  
phate, Na salt  
4.5 parts sulphosuccinic acid semi-ester of  
fatty alcohol polyglycoether, Na salt  
0.5 parts alkyldimethylbenzylammonium  
chloride  
Remainder water to 100

30 6. A liquid car-wash:  
10 parts of sulphosuccinic acid semi-ester  
of fatty alcohol polyglycoether, Na-  
monoethanolamine salt,

35 40 10 parts of alkyldimethylhydroxyethyl-  
ammonium chloride  
Remainder water to 100

7. A liquid water-repellent and anti-static  
cleansing agent:  
45 15 parts of sulphosuccinic acid semi-ester  
of fatty alcohol polyglycoether,  
Na-NH<sub>3</sub> salt  
10 parts alkylhydroxyethylimidazolinium  
chloride  
50 Remainder water to 100.

8. A disinfectant for personal use:  
10 parts sulphosuccinic acid semi-ester of  
fatty alcohol polyglycoether, sodium salt  
5 parts fatty acid diethanolamide  
55 5 parts alkyldimethylbenzylammonium  
phthalimidate  
Remainder water to 100.

9. A liquid de-odourizing foam bath:  
30 parts sulphosuccinic acid semi-ester of  
fatty acid alkyloamide, Na salt.  
6 parts fatty acid alkyloamide  
4 parts alkyldimethylbenzylammonium  
saccharinate  
60 Remainder water to 100.

65 10. An anti-static wash paste:—

30 parts sulphosuccinic acid semi-ester of  
fatty acid alkyloamide, Na salt  
3 parts fatty acid monocethanolamide  
3 parts fatty alcohol sulphate  
2 parts alkyltrimethylammonium sulphimi-  
date  
Remainder water to 100.

**WHAT WE CLAIM IS:—**

1. A mixture comprising a multi-functional  
anionic detergent and a cation-active com-  
pound, the proportion of the latter to the  
former not exceeding the molar ratio of 75

$\frac{n-1}{m}$

where  $n$  and  $m$  represent the number of  
functions of the anionic detergent and cation-  
active compound, respectively. 80

2. A mixture as claimed in claim 1, which  
the anionic detergent is bifunctional and the  
proportion of anionic detergent to cationic  
compound is up to the molar ratio of 1:1. 85

3. A mixture as claimed in claim 1, in  
which the anionic detergent is trifunctional  
and the proportion of anionic detergent to  
cationic compound is up to the molar ratio of 1:2. 90

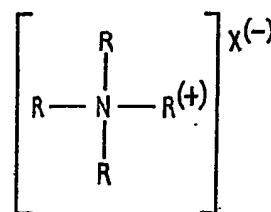
4. A detergent mixture comprising a multi-  
functional anionic detergent and a cation-  
active compound selected from the class of so-  
called onium compounds, the proportion of the  
latter to the former in the composition not 95  
exceeding the molar ratio of

$\frac{n-1}{m}$

where  $n$  and  $m$  represent the number of  
functions of the anionic detergent and cation-  
active-compound respectively. 100

5. A mixture as claimed in claim 4 in which  
the onium compound is an ammonium, phos-  
phonium, pyridinium or sulphonium com-  
pound. 105

6. A mixture as claimed in claim 5, in  
which the onium compound is a quaternary  
ammonium compound of the general formula



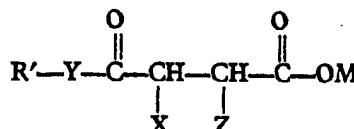
in which R represent an alkyl group and X is  
an anion. 110

7. A mixture as claimed in claim 6, in  
which X represents an halide, the phthalimi-

date, saccharinate,  $\text{HSO}_4^-$  or acid sulphimide anion.

8. A mixture as claimed in claim 6, in which one of substituents R represents a long chain alkyl residue having from 4 to 22 carbon atoms.

9. A mixture comprising a bi-functional anionic detergent of the general formula



10 in which R' represents an alkyl residue having at least 6 carbon atoms, Y represents a hydrocarbon chain optionally substituted with oxygen or nitrogen or both, either of X and Z represents a hydrogen atom and the other is 50  
15 the group  $\text{SO}_3\text{M}$ , and M is a pharmaceutically or cosmetically acceptable cation; and a cation-active compound, the proportion of the latter to the former in the composition not exceeding the molar ratio of

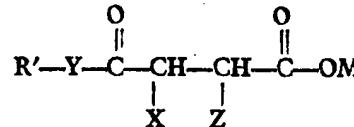
$$\frac{n-1}{m}$$

where n and m represent the number of functions of the anionic detergent and cation-active compounds, respectively.

10. A mixture as claimed in claim 9, in which substituent M of the general formula represents a metal, amine, alkanolamine or ammonium.

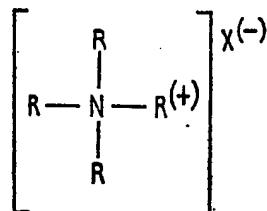
11. A mixture as claimed in claim 9, in which the anionic detergent is a sulpho-fatty acid, a compound with two sulpho-groups or with one sulpho-group and a carboxyl-group or with two carboxyl groups in the molecule, a phosphonic acid with an alkyl residue and two acid functions or an alkylphosphoric acid 35 with two acid functions.

12. A mixture comprising a multi-functional anionic sulphosuccinic detergent of the general formula



40 (in which R' represents an alkyl residue having at least 6 carbon atoms, Y represents a hydrocarbon chain optionally substituted with oxygen or nitrogen or both, either of X and Z represents a hydrogen atom and the other is 45 the group  $-\text{SO}_3\text{M}$ , and M is a pharmaceutically or cosmetically acceptable cation), and a

cation quaternary ammonium compound of the general formula



(in which R is an alkyl group and X is an anion), the proportion of the latter to the former not exceeding the molar ratio of

$$\frac{n-1}{m}$$

where n and m represent the number of functions of the anionic sulphosuccinic detergent and cation quaternary ammonium compound respectively.

13. A mixture as claimed in claim 12, in which the anionic detergent is bifunctional and the proportion of anionic detergent to cationic compound is up to the molar ratio of 1:1.

14. A mixture as claimed in claim 12, in which the anionic detergent is trifunctional and the proportion of anionic detergent to cationic compound is up to the molar ratio of 1:2.

15. A mixture as claimed in any of the preceding claims, in which the anionic detergent is a lauryl alcohol derivative.

16. A mixture as claimed in any of the preceding claims, in which the anionic detergent is a lauryl alcohol derivative of a sulpho-succinic acid.

17. A mixture as claimed in any of the preceding claims, in which the cationic compound is an alkylidimethylbenzylammonium compound.

18. A mixture as claimed in any of the preceding claims, substantially as herein described.

19. An aqueous solution of a mixture as claimed in any of the preceding claims.

20. A cleaning composition formed from a mixture as claimed in any claims 1 to 18.

21. A cosmetic composition formed from a mixture as claimed in any of claims 1 to 18.

22. A composition formed from a mixture comprising a multifunctional anionic detergent and a cation compound substantially as herein described with reference to any of formulations 1 to 10.

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